

REMARKS/ARGUMENTS

Status of the claims

Claims 1-30, 51-52, 57-59 and 67-69 are pending and under examination. Claims 4, 6, 51, 52 and 58 were objected to as being dependent upon a rejected base claim, but were otherwise allowable. Claims 1-30, 51, 52, 57-59 and 67-69 were rejected on the ground of non-statutory-type double patenting as being unpatentable over claims 1-8, 10-25, 46-47, 52-53 and 61-63 of U.S. Patent No. 7,351,376. Claims 1-3, 57, 59 and 67-69 were rejected as allegedly obvious over U.S. Patent No. 6,318,970 to Backhouse ("Backhouse"). Claims 5 and 7-30 were rejected as allegedly obvious over Backhouse in view of U.S. Patent No. 6,043,080 to Lipshutz ("Lipshutz"). Applicants respectfully request reconsideration of the application in view of the remarks and amendments made herein.

The Amendments

By virtue of this response, claims 1, and 57-59 have been amended. No new matter has been added. Accordingly, claims 1-30, 51-52, 57-59 and 67-69 are currently under consideration.

Claim 1 has been amended by adding the word "and." This amendment is to correct grammar and does not change scope or meaning of the claim.

Claim 57 has been amended to recite "a microvalve separating each loop channel from at least one service channel" This amendment adds no new matter and is supported by the specification, e.g. in paragraph [0060] and paragraph [0063].

Claim 58 is otherwise allowable, and has been rewritten in independent form.

Claim 59 has been rewritten in independent form.

The rejections will be addressed in the order presented in the Office Action.

A. Non-statutory Double Patenting

The Office Action has rejected claims 1-30, 51, 52, 57-59 and 67-69 on the ground of nonstatutory obviousness-type double patenting as allegedly being unpatentable over claims 1-8, 10-25, 46-47, 52-53 and 61-63 of U.S. Patent No. 7,351,376. The Applicants submit

herewith a terminal disclaimer with this response. The terminal disclaimer disclaims the terminal portion of the term of a patent granted on the instant application over the cited patent. Therefore, the Applicants respectfully request withdrawal of the rejection and allowance of the pending claims.

Applicants respectfully note that the filing of a terminal disclaimer to obviate a rejection based on non-statutory double patenting is not an admission of the propriety of the rejection. *See*, M.P.E.P. § 804.02.

B. Rejection under 35 U.S.C. §103 over Backhouse

Claims 1-3, 57, 59 and 67-69 were rejected under 35 U.S.C. §103(a) as allegedly obvious over Backhouse. Specifically, the Office Action states that Backhouse disclosed a microfluidic device “comprising a loop channel intersecting with a main channel and a pump associated with the loop channel driving fluid in circulation” (Office Action, page 4). The Office alleged that “it would have been obvious to one of ordinary skill in the art to include a valve ... in the intersection of the loop and main channels of Backhouse, in order to provide for free flow within the loop channel without loss to the main channel” (Office Action, pages 4-5). Applicants assert that the presently claimed invention is not obvious in view of the cited art for at least the following reason: one of skill in the art would not have modified the microfluidic device taught by Backhouse by adding a valve as proposed by the Office as it would destroy the function performed by the Backhouse device.

B1. Modification of Backhouse as proposed by the Office would destroy the function of the Backhouse device

The Office argues that one skilled artisan would have been motivated to modify Backhouse device to arrive at Applicants’ invention. Applicants respectfully disagree. It is well established that if a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *See In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). Also see M.P.E.P. §2143.01 V.

The Backhouse device is a micropump for transport of fluid in a microfluidic environment. As illustrated at column 5 and Figs. 9A-E of Backhouse, the device comprises a channel 90 that “carries the driven fluid” (column 5, line 24; Figs. 9A-E), and a channel 92 that carries the drive fluid (column 5, lines 35-36; Figs. 9A-E). The function of the drive fluid is to move the driven fluid through channel 90. The drive fluid is a fluid, such as a ferrofluid, that is capable of being moved around under the influence of a magnetic field (column 2, lines 58-65). Ferrofluids are colloidal suspensions of ultramicroscopic magnetic particles in a carrier liquid, usually used as lubricants or damping fluids (column 4, lines 45-52). The drive fluid is preferably immiscible in the driven fluid (column 4, lines 39-52). Under the action of a magnetic drive, the drive fluid is recirculated around channel 92 (column 5, lines 48-54). The driven fluid, on the other hand, is moved “along the channel 90, tangentially to the channel 92” (column 5, lines 50-51). Therefore, the intended purpose of the Backhouse devices as shown in Figs. 9A-E is to pump driven fluid through channel 90.

The Office suggests it would have been obvious to one skilled in the art to modify the Backhouse device by including a valve at the intersection of channel 90 and channel 92. However, such a modification would destroy the function of Backhouse.

As described above, the Backhouse device as shown in Figs. 9A-E is intended to function as a pump to move the driven fluid along the channel 90. This is accomplished by the recirculation of the drive fluid around channel 92 under a magnetic drive. Therefore, if one were to pump driven fluid through channel 90 using the Backhouse device, one would have to ensure the movement of the driven fluid “along the channel 90, tangentially to the channel 92.” Furthermore, as specifically taught by Backhouse, one would also have to “ensure recirculation of drive fluid around” channel 92. If a valve is included at point 94 or 96 along the path of channel 90, the driven fluid would not be able to move along the channel 90. If a valve is to be included at point 94 or 96 along the path of channel 92, the drive fluid would not be able to be recirculated around channel 92. No matter where a valve is placed, the Backhouse device as modified would be inoperable for its intended purpose because either (1) the drive fluid would be trapped within channel 92 and would not be able to recirculate around channel 92; or (2) the flow of the driven fluid would be stopped at point 94 or 96, and would not be pumped through

channel 90. Either way, the proposed modification would render the Backhouse device unsatisfactory for its intended purpose.

Claims 2 and 3 depend from claim 1. Applicants respectfully traverse the Office's rejections for the same reasons as set forth above.

In view of the above remarks, Applicants respectfully submit that the rejections of claims 1-3 under 35 U.S.C. §103(a) should be withdrawn.

B2. Claims 57, 67-69 are not obvious over Backhouse

Claims 57, 67-69 are rejected as allegedly obvious over Backhouse. Claim 57 is amended to recite "a microvalve separating at least one of the plurality of loop channels from the service channel." Claims 67-69 are dependent from claim 57. Applicants respectfully submit that claims 57, 67-69 as amended are not obvious for at least the reasons set forth in section B1.

B3. Claim 59 is not obvious over Backhouse

Claim 59 is rejected as allegedly obvious over Backhouse. Specifically, the Office Action states that "[i]t would have been obvious to one of ordinary skill in the art to use multiple loop channels in order to provide for replicate reaction chambers with their associated determinations or to provide for chambers capable of supporting different reactions" (Office Action, page 5). The Office acknowledged that "Backhouse does not teach a plurality of loop channels, each with an associated pump and disposed with target molecules" (Office Action, page 5). Applicant respectfully traverses this rejection with respect to claim 59.

Claim 59 recites "wherein a set of target molecules is disposed within each loop channel." This aspect of the claimed invention is not shown or suggested by Backhouse. Therefore, Backhouse fails to teach or even suggest all of the elements of the claimed invention.

Furthermore, there is no objective reason to modify the Backhouse device to include a set of target molecule disposed within channel 92. As discussed in section B1 above, the Backhouse device functions as a micropump. Nothing in Backhouse taught or suggested that micropumps are suitable for reaction chambers, nor would a person skilled in the art have used a micropump as a reaction chamber.

In view of the above remarks, Applicants respectfully submit that the rejection of claim 59 under 35 U.S.C. §103(a) should be withdrawn.

C. Rejection under 35 U.S.C. §103 over Backhouse in view of Lipshutz

C1. Claims 5, 7-9 are not obvious over Backhouse in view of Lipshutz

Claims 5, 7-9 are rejected as allegedly obvious over Backhouse in view of Lipshutz. Lipshutz teaches miniature analytical devices that include a plurality of distinct reaction chambers disposed in a single, miniature body (column 2, lines 14-16). The Office Action states that “[i]t would have been obvious to one of ordinary skill in the art to use the target molecules of Lipshutz in the loop channel of Backhouse,” or “to immobilize proteins in such loop” (Office Action, page 6). Claims 5, 7-9 depend from claim 1. Backhouse teaches a pump incompatible with the modification proposed by the Office. Moreover, nothing in Backhouse suggested target molecules disposed in the micropump described in Backhouse.

C2. Claims 10-12 are not obvious over Backhouse in view of Lipshutz

Claims 10-12 are rejected as allegedly obvious over Backhouse in view of Lipshutz. Specifically, the Office Action states that “[i]t would have been obvious to one of ordinary skill in the art to include a window for detection in the device of Backhouse in order to provide visual confirmation of mixing or reaction within the loop channel” (Office Action, page 7), and that “[i]t would have been obvious to one of ordinary skill to use a deformable material such as an elastomer” (Office Action, page 7). Claims 10-12 depend from claim 1. Applicants respectfully traverse the Office’s rejections for the same reasons as set forth in section B1.

C3. Claims 13-14 are not obvious over Backhouse in view of Lipshutz

Claims 13-14 is rejected as allegedly obvious over Backhouse in view of Lipshutz. Specifically, the Office Action states that “[i]t would have been obvious to one of ordinary skill to use a deformable material such as an elastomer” (Office Action, page 7). Claims 13-14 depend from claim 1. Applicants respectfully traverse the Office’s rejections for the same reasons as set forth in section B1.

C4. Claims 15-18 are not obvious over Backhouse in view of Lipshutz

Claims 15-18 are rejected as allegedly obvious over Backhouse in view of Lipshutz. Specifically, the Office Action states that “[i]t would have been obvious to one of ordinary skill to use a transparent material for a detection region” (Office Action, page 7). Claims 15-18 depend from claim 1. Applicants respectfully traverse the Office’s rejections for the same reasons as set forth in section B1.

C5. Claims 19-28 are not obvious over Backhouse in view of Lipshutz

Claims 19-28 are rejected as allegedly obvious over Backhouse in view of Lipshutz. Specifically, the Office Action states that “[i]t would have been obvious to one of ordinary skill to use [treatment layer and control layer as taught by Lipshutz],” or to fit a valve to an intersection of layers, or to use membrane or deformable material as a valve, or to use a gas for positive pressure, or to use a transparent material for a detection region (Office Action, pages 8-9). Claims 19-28 depend from claim 1. Applicants respectfully traverse the Office’s rejections for the same reasons as set forth in section B1.

C6. Claims 29-30 are not obvious over Backhouse in view of Lipshutz

Claims 29-30 are rejected as allegedly obvious over Backhouse in view of Lipshutz. Specifically, the Office Action states that “[i]t would have been obvious to one of ordinary skill to use a detection region in the loop channel of the devices for biochemical analysis” (Office Action, page 10). Claims 29-30 depend from claim 1. Applicants respectfully traverse the Office’s rejections for the same reasons as set forth in section B1.

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Amdt. dated January 28, 2009
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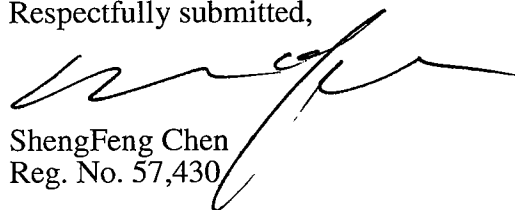
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CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 415-576-0200.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'ShengFeng Chen', is written over the typed name and registration number.

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